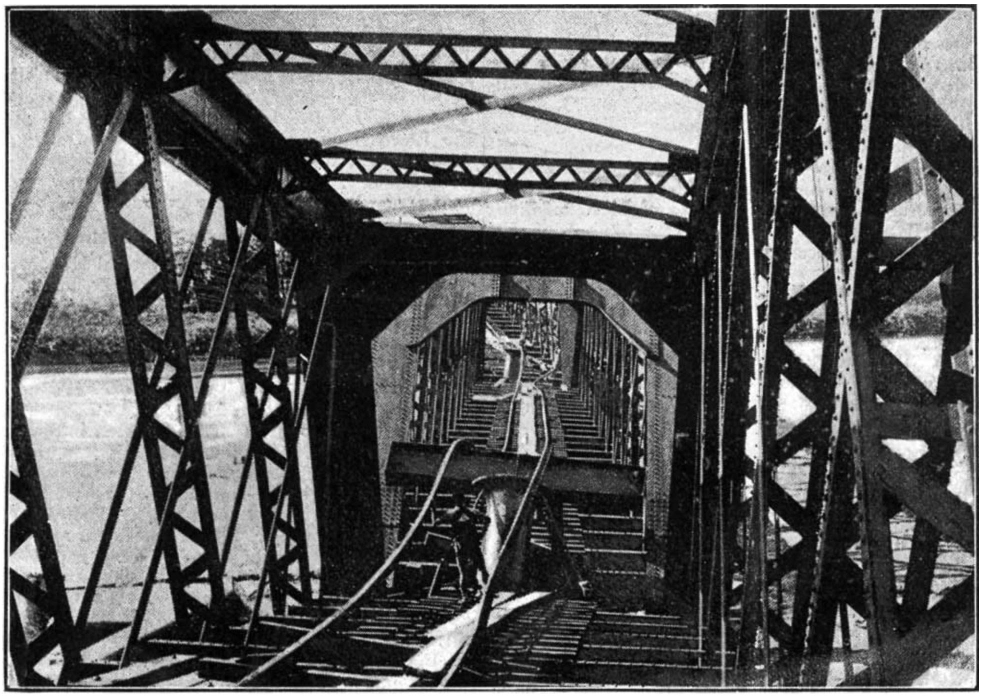
great curves. Many of these photographs tell, incidentally, a very sad story of the loss and suffering endured by the people of the district.

In the short descriptive remarks which accompany the plates, Prof. Milne has succeeded in giving us much valuable information concerning the earthquake. The Gifu plain is situated about the centre of the Japanese Empire, and consists of a thick alluvial deposit resting on metamorphic rocks, the district being highly cultivated and thickly populated. The severely shaken district, in which complete destruction of buildings and engineering works occurred, measured 4200 square miles, but the effects were felt over an area of 92,000 square miles; and ten thousand people lost their lives, while fifteen thousand were wounded. The earthquake is believed to have originated in the Mino Mountains; but it was in the soft alluvial plain adjoining that the earth-movements were most severely felt. The district thus violently affected supported a population of about 800 to the square mile. Earthquakes have been recorded as occurring in this area, which lies quite away from any volcanic centres, in 1826, in 1827, in 1859, and in 1880; and during the last ten centuries there have been many terrible catastrophes affecting this area which are noticed in the Japanese records.



We look forward with much interest to the publication of the full account of this destructive, and in many respects remarkable, display of seismic energy, which is promised to us by the Professors of the Imperial University of Japan.

J. W. J.

THE ROYAL SOCIETY SELECTED CANDIDATES.

The following fifteen candidates were selected on Thursday last (May 5) by the Council of the Royal Society to be recommended for election into the Society. The ballot will take place on June 2, at 4 p.m. We print with the name of each candidate the statement of his qualifications.

ROBERT YOUNG ARMSTRONG, Lieut.-Colonel R.E.,

From 1870 to 1875 was Assistant Instructor in Submarine Mining and Electricity, and from 1875 to 1882 was Instructor. From 1884 to the present date, Inspector of Submarine Defences of the United Kingdom, Military Ports, and Coaling Stations. From June 1883 to December 1888, adviser to the Board of Trade in electrical matters connected with the Electric Lighting Acts. Was connected with the development of the present apparatus and electrical and mechanical processes employed in submarine mining, and with the compilation of the army instructional books and methods on electricity and submarine mining since 1870. Distinguished as an electrical engineer. It may be said that the present satisfactory state of defensive torpedo warfare in this country is very largely due to his ability and energy.

FRANK EVERS BEDDARD, M.A. (Oxon.),

Lecturer on Comparative Anatomy, Guy's Hospital. Prosector to the Zoological Society. Author of the following papers:—"Report on the Isopoda, collected by H.M.S. *Challenger*" (Parts xxxiii., xlviii.); "Nephridia of Acanthodrilus and of Perichæta" (Proc. Roy. Soc., 1886-87); "Structure of Megascolea" (Trans. Roy. Soc. Edin., 1883); "Minute Anatomy of the Ovary of Echidna"; "Subdivision of the Cœlom in Birds and Reptiles" (Proc. Zool. Soc., 1886-88); "Visceral and Muscular Anatomy of Scopus" (*ibid.*, 1885); "Anatomy of various little-known Types of Birds" (*ibid.*) With other papers on Comparative Anatomy in *Ann. and Mag. Nat. Hist.*, *Ibis*, and *Quart. Journ. Micros. Sci.*

JOHN AMBROSE FLEMING, M.A. (Camb.),

D.Sc. (Lond.). Professor of Electrical Engineering in University College, London. Late Fellow of St. John's College, Cambridge. Fellow of University College, London. Some time Demonstrator in Applied Mechanics in the University of Cambridge. Author of the following papers, among others:—"The Polarisation of Electrodes in Water free from Air" (Proc. Phys. Soc., 1874); "A New Form of Resistance

Balance" (Proc. Phys. Soc., 1880); "On the Characteristic Curves and Surfaces of Incandescent Lamps"; "On Molecular Shadows in Incandescent Lamps"; "On the Use of Daniell's Cell as a Standard of Electromotive Force"; and "Problems in the Distribution of Electric Currents in Networks of Conductors" (Proc. Phys. Soc., 1885); "On the Necessity for a National Standardising Laboratory for Electrical Instruments" (Proc. Inst. Elect. Engs., 1885); "A Design for a Standard of Electrical Resistance" (Proc. Phys. Soc., 1889); "On Electric Discharge between Electrodes at different Temperatures in Air and in High Vacua" (Proc. Roy. Soc., 1889); "On Some Effects of Alternating Current Flow in Circuits having Capacity and Self-induction" (Proc. Inst. Elect. Engs., 1891). Delivered Friday Evening Discourses at the Royal Institution in 1890-91. Author of "Short Lectures to Electrical Artisans," four editions; and of "The Alternate Current Transformer in Theory and Practice."

Clement Le Neve Foster, D.Sc. (Lond.),

F.G.S., Professor of Mining in the Royal College of Science, and H.M. Inspector of Mines. A.R.S.M. He is distinguished for his knowledge of mining in its various scientific aspects; and is the author of numerous papers bearing on Geology, Mineralogy, and Mine-engineering. He has carried on explorations and mining works in Italy, Egypt, and Venezuela, and was for some years a Member of the Geological Survey of England and Wales, in connection with which he made important discoveries bearing on the question of the denudation of the Weald. His papers are published in the Journals of the Geological and Statistical Societies, and other journals.

Hans Gadow, Ph.D. (Jena),

Hon. M.A. Cantab. Strickland Curator and Lecturer on the Advanced Morphology of Vertebrata in the University of Cambridge. A naturalized British subject, engaged in research in Animal Morphology. Author of "Versuch einer vergleichenden Anatomie des Verdauungssystemes der Vögel" (Inaugural Dissertation, *Jenaische Zeitschr.*, xiii., 1879): "Zur vergleichenden Anatomie der Musculatur der Beckens und der hinteren Gliedmasse der Ratitæ" (4to, Jena, 1880, 5 plates); "Untersuchungen über die Bauchmuskeln der Krokodile, Eidechsen und Schildkröten" (*Morphol. Jahrb.*, vii., p. 57); "Beiträge zur Myologie der hinteren Extremität der Reptilien" (*ibid.*, p. 329): "Observations on Comparative Myology" (*Journ. of Anat.*, 1882, p. 493); "Catalogue of Birds in the British Museum" (vols. viii. and ix.); "On the Colours of Feathers as affected by their Structure" (Zool. Soc. Proc., 1882, p. 409); "On the Reproduction of the Carapace in Tortoises" (*Journ. of Anat.*, 1886, p. 220); "On the Cloaca and Copulatory Organs of Amniota" (Phil. Trans., 1887); "On the Modifications of the First and Second Visceral Arches, with Especial Reference to the Homologies of the Auditory Ossicles" (Phil. Trans., 1888); Volume "Aves" in Bronn's "Klassen und Ordnungen des Theirreichs" (in publication). Conjointly with Dr. Gaskell:—"On the Anatomy of the Cardiac Nerves in certain Cold-blooded Vertebrates" (*Journ. of Physiol.*, v.); "Suctorial Apparatus of the Tenuirostres (1883); "On the Anatomical Differences in the Three Kinds of Rhea" (1885); "On some Points in the Anatomy of *Pterocles arenarius*, with remarks on its Systematic Position (1882). "Introduction to the Osteology of the Mammalia," by W. H. Flower, F.R.S., third edition revised with the assistance of Hans Gadow (1885).

Robert Giffen, LL.D. (Glasc.),

Assistant Secretary (Commercial Department) Board of Trade. Author of "Stock Exchange Securities: an Essay on General Causes of Fluctuation of their Price" (1878); "Essays in Finance," 1st series (1879), 2nd series (1885): "The Growth of Capital" (1889); also of numerous papers communicated to the British Association, Statistical Society, Bankers' Institute, &c. As head of the Statistical Department of the Board of Trade (since incorporated with the Commercial Department) has been examined by Royal Commissions and Parliamentary or Treasury Committees on the following subjects (among others): Depreciation of Silver (1876); Hall Marking; Wine Duties; Agricultural Depression; Trade Depression; Stock Exchange; Gold and Silver; Channel Tunnel; Emigration and Immigration; Corn Averages, &c. Has given great attention to the theory and practice of the use of Index Numbers in the study of Prices and their history, and first invented and used the plan of an Index Number of a purely objective and not an arbitrary character, especially one based on the actual proportion of the different articles of Import and Export to the total. Has explained with regard to numerous branches of statistics, such as imports and exports, the condition and nature of the data, and the way in which they can be used in public discussions. Has also explained in numerous papers the way in which common statistics can be used in stating and solving problems for the politician, *e.g.* statistics of the growth of population, of the growth of incomes and capital. Has also given attention to the problems relating to the incidence of taxation, upon which several papers are included in the "Essays in Finance." Author of numerous official reports, including reports on wages, prices of imports and exports, emigration, &c.

Francis Gotch, M.R.C.S.,

B.A., B.Sc. (Lond.), Hon. M.A. (Oxon.). Has made researches of value into the physiology of the nervous system, and is the author of the following papers:—"On the Electromotive Properties of the Electrical Organ of Torpedo" (Phil. Trans., 1887, B., p. 487, and 1888, B., p. 329); "On the Electrical Organ of the Skate," with Dr. Burdon Sanderson, F.R.S. (*Journ. of Physiol.*, vol. ix., p. 137, and vol. x., p. 259); "On the Electromotive Changes in the Mammalian Spinal Cord following Electrical Excitation of the Cortex Cerebri," with Prof. Horsley, F.R.S. (Roy. Soc. Proc., vol. xlv., p. 18); as well as of other shorter papers on similar subjects.

William Abbott Herdman, D.Sc.,

F.R.S.E., F.L.S. Professor of Natural History in University College, Liverpool. Distinguished as a Zoologist, and especially for researches into the structure and relations of the Tunicata. Author of the following, amongst other papers:—"Report on the Tunicata of the *Challenger* Expedition," Parts I., II., and III. (*Challenger* Rept., Zool., vol. vi., 1892; vol. xiv., 1886; vol. xxvii., 188); "On the Invertebrate Fauna of Lamlash Bay" (Roy. Phys. Soc. Edin. Proc., vol. v., 1879, and vol. vi., 1880); "On the Olfactory Tubercle, &c., in Simple Ascidians" (*ibid.*, 1881); "On Individual Variations in the Branchial Sac of Ascidians" (Linn. Soc. Journ., vol. xv., 1881); "The Hypophysis Cerebri in Tunicata and Vertebrata" (Roy. Soc. Edin. Proc., 1883): "Report on the Tunicata of the *Triton* Expedition" (Roy. Soc. Edin. Trans., vol. xxxii., 1883); "Report on the Tunicata of the *Lightning* and *Porcupine* Expeditions" (*ibid.*, 1884); "On the Phylogeny of the Tunicata" (Roy. Soc. Edin. Proc., 1885-86);) "On the Structure of Sarcodictyon" (Roy. Phys. Soc. Edin. Proc., 1884); "On the Structure and Functions of the Cerata or Dorsal Papillæ in some Nudibranchiate Mollusca" (*Quart. Journ. Micros. Sci.*, 1890); and of important Reports on the Fauna of Liverpool Bay, 1886–90.

Frederick Wollaston Hutton, Captain, R.E.,

Professor of Geology in Canterbury College. F.G.S., C.M.Z.S., Cor. du Mus. d'Hist. Nat. Paris, Cor. Mem. Roy. Soc. Tas., Hon. Mem. Roy. Soc. N.S.W., Cor. Acad. Nat. Sci. Philad., Cor. Ornith. Ver. Wien., Cor. K. K. Geol. Reichsanst. Wien. Author of numerous reports, papers, &c., published by the New Zealand Government, the Geological and Zoological Societies, the New Zealand Institute, &c., and in the *Phil. Mag.* Amongst them are:—"Fishes of New Zealand," 1872; "Geology of the Thames Gold Field (Government Report, 1868-69); "Sketch of the Geology of New Zealand" (Quart. Journ. Geol. Soc.); "Birds inhabiting the Southern Ocean" (*Ibis*, 1865); "On *Peripatus N. Zealandiæ*"; "On the Structure of *Amphibola avellana*"; "Origin of the Fauna and Flora of New Zealand" (*Ann. and Mag. Nat. Hist.*); "Eruptive Rocks of New Zealand," Oscillations of the Earth's Surface (Aust. Assoc. Advt. Sci., 1889); "On Dimensions of Dinornis Bones" (Trans. N. Z. Inst.); "New Zealand Land Shells"; "Revision of the Land Mollusca of New Zealand" (*ibid.*, vol. xvi.). Author of a Class-book of Geology, and of Zoological Exercises for Students in New Zealand. Author of eleven papers in Proc. Linn. Soc. N.S.W. Has done much valuable work in other ways for the advancement of science in New Zealand.

John Joly, M.A.,

Assistant to the Professor of Civil Engineering in the University of Dublin. Has discovered (*a*) by direct measurement a variation of specific heat at constant volume of various gases with density; (*b*) Iolite in the Granites of Leinster; (*c*) a heterogeneous Beryl Felspar mineral; (*d*) the reversal of *Oldhamia antiqua* and *radiata* impressions in the Slates of Bray Head. Is the author, amongst other papers, of the following:—"On the direct experimental determination of Specific Heats of Gases at Constant Volume" (Proc. Roy. Soc., vol. xlviii., in abstract, recommended for Phil. Trans.); "On the Method of Condensation in Calorimetry" (Proc. Roy. Soc., vols. xlv. and xlvii.); "On the Specific Heats of Minerals" (*ibid.*, vol. xli.); "Observations of Spark Discharge over Surfaces of Dielectrics" (*ibid.* vol. xlvii.); "On the Volcanic Ash of Krakatoa" (Proc. Roy. Dubl. Soc., vol. iv.). Has invented (*a*) the Method of Steam Calorimetry (Trans. and Proc. Roy. Soc., as above); (*b*) a Diffusion Photometer (*Phil. Mag.*, July 1888); (*c*) a Hydrostatic Balance (*ibid.*, Sept. 1888); (*d*) an Instrument for measuring Melting and Boiling Points of Solids, &c., up to a very high temperature (NATURE, vol. xxxiii., and *Industries*, vol. vi.); (*e*) a Method of measuring the Density of a Gas (*Phil. Mag.*, vol. xxx.); (*f*) a Method of reading Distant Meteorological Instruments (Proc. Roy. Dubl. Soc., vol. iv.); (*g*) a Method of measuring Specific Gravities of Minute Quantities of Porous and other Solids (*Phil. Mag.*, July 1888.

JOSEPH LARMOR, M.A.,

D.Sc. Fellow of St. John's College, Cambridge. University and College Lecturer in Mathematics. Senior Wrangler, 1880. Formerly Professor of Mathematics Queen's College, Galway. Fellow of the Royal University of Ireland. Examiner in Mathematics at the University of London. Author of the following papers:—"Application of Generalized Space Coordinates, Potentials, and Isotropic Elasticity" (Trans. Camb. Phil. Soc., vol. xiv.); "Least Action" (Proc. Lond. Math. Soc., vol. xv.); "Flow of Electricity in Linear Conductors" (*ibid.*, vol. xvi.); "Characteristics of an Asymmetric Optical Combination" (*ibid.*, vol. xx.); "Electro-magnetic Induction in Conducting Sheets and Solid Bodies" (*Phil. Mag.*, 1884); and other papers on Pure and Applied Mathematics.

LOUIS C. MIALL,

Professor of Biology in the Yorkshire College. Prof. Miall has published the following papers and books:—Reports on Labyrinthodonts (Rep. Brit. Assoc., 1873-74): the first translated as introduction to S. Anton Fritsch's "Fauna der Permformation Böhmens"; Fossil Teeth of Ceratodus (Palæont. Indica); Sirenoid and Crassopterygian Ganoids, Part I. (Palæont. Soc.); papers on Labyrinthodonts, Rhizodus, Ctenodus, and Megalichthys (Quart. Journ. Geol. Soc.): Studies in Comparative Anatomy: I. Skull of Crocodile, II. Anatomy of the Indian Elephant (jointly with F. Greenwood), III. The Cockroach (jointly with H. Denny); Vertebrate Palæontology in Geol. Record (Sub-editor). In 1875 received the Wollaston Donation from the Geological Society.

BENJAMIN NEVE PEACH,

F.R.S.E., F.G.S. District Surveyor of the Geological Survey of Scotland. Past President of the Physical Society of Edinburgh. Recipient of the Wollaston Donation Fund of the Geological Society in 1887. For thirty years actively engaged on the Geological Survey, during which time he has mapped many of the most complicated districts of Scotland. Has charge of the surveying of the North-West Highlands, and has taken the leading part in unravelling the remarkable structural complications of that region. Author of various papers on palæontological subjects:—"On some New Crustaceans from the Lower Carboniferous Rocks of Eskdale and Liddesdale" (Trans. Roy. Soc. Edin., vol. xxx., p. 73); "On some new species of Fossil Scorpions from the Carboniferous Rocks of Scotland" (*ibid.*, p. 399); "Further Researches among the Crustacea and Arachnida of the Carboniferous Rocks of the Scottish Border" (*ibid.*, p. 511); "On some Fossil Myriapods from the Lower Old Red Sandstone of Forfarshire" (Proc. Roy. Phys. Soc. Edin., vol. vii. p. 179). Joint author with Mr. J. Horne of many papers on stratigraphical and physical geology, including:—"The Glaciation of the Shetland Isles" (Quart. Journ. Geol. Soc., vol. xxxv. p. 778); "The Glaciation of the Orkney Islands" (*ibid.*, vol. xxxvi. p. 648); "The Old Red Sandstone of Shetland" (Proc. Roy. Phys. Soc. Edin., vol. v. p. 30); "The Glaciation of Caithness" (*ibid.*, vol. vi. p. 316); "Report on the Geology of the North-West of Sutherland" (NATURE, vol. xxxi. p. 31); "The Old Red Sandstone Volcanic Rocks of Shetland" (Trans. Roy. Soc. Edin., vol. xxxii. p. 539); "Report on the Recent Work of the Geological Survey in the North-West Highlands of Scotland, based on the Field Maps of B. N. Peach, J. Horne, W. Gunn, C. T. Clough, L. Hinxman, and H. M. Cadell" (Quart. Journ. Geol. Soc., vol. xliv. p. 378).

ALEXANDER PEDLER,

F.C.S., F.I.C., Fellow of the University of Calcutta; Professor of Chemistry, Presidency College, Calcutta; Meteorological Reporter to the Government of Bengal; and Curator of the Bengal Government Museum at Calcutta. Author of papers on "An Isomeric Modification of Valeric Acid," "Calcutta Coal Gas," "The Use of the Radiometer as a Photometer," "Cobra Poison," "The Past and Present Water Supplies of Calcutta," "Technical Education for Bengal," "The False Point Cyclone of September 22, 1885," published in the Proc. Roy. Soc., the Journ. Chem. Soc., the Journ. Asiat. Soc. Beng., and elsewhere.

AUGUSTUS D. WALLER, M.D.,

Lecturer on Physiology at St. Mary's Hospital Medical School. Distinguished as a Physiologist. Lauréat de l'Institut de France (Prix de Physiologie Expérimentale). Contributions to the Royal Society:—"On the Influence of the Galvanic Current on the Excitability of the Motor Nerves of Man" (with Dr. de Watteville, Phil. Trans., 1882); "On the Influence of the Galvanic Current on the Excitability of the Sensory Nerves of Man" (Roy. Soc. Proc., 1882); "On the Action of the Excised Mammalian Heart" (with Dr. Reid, Phil. Trans., 1887); "On the Electromotive Changes connected with the Beat of the Mammalian Heart" (Phil. Trans., 1889). Contributions to the *Journal of Physiology*:—"On the Rate of Propagation of the Arterial Pulse Wave" (vol. iii., 1880); "A Demonstration in Man of Electromotive Changes accompanying the Heart's Beat" (vol. viii., 1887) Contributions to other journals, English and foreign:—"Die Spannungen in den Vorhöfen des Herzens" (*Arch. f. Anat. u. Physiol.*, 1878); "On Muscular Spasms known as Tendon Reflex" (*Brain*, 1880); "Nouvelles Expériences sur les Phénomènes nommés Réflexes tendineux" (with Dr. Prévost, *Rev. Méd. de la Suisse Romande*, 1881); "Sur la Contraction de l'Ouverture" (*Journ. de Physiol.*, 1882), &c.

NOTES.

THE Council of the British Association for the Advancement of Science have nominated Dr. J. S. Burdon Sanderson, F.R.S., Waynflete Professor of Physiology in the University of Oxford, President for the meeting of the Association which will be held next year at Nottingham. Dr. Sanderson has accepted the nomination.

THE Gold Medal of the Linnean Society has this year been awarded by the Council to Dr. Alfred Russel Wallace for his important contributions to the literature of zoology. The medal will be presented at the forthcoming anniversary meeting of the Linnean Society, to be held at Burlington House on the 24th inst.

WE regret to have to record the death of the illustrious chemist, August Wilhelm Hofmann. He died on May 5. Prof. Hofmann was well known in England, where he spent many of his best years. On Liebig's recommendation he was appointed in 1848 Superintendent of the Royal College of Chemistry, in London. This institution, which made great progress under his care, was in 1853 merged in the Royal School of Mines as the Chemical Section. He became a Warden of the Royal Mint in 1855. In 1864 he accepted the chair of chemistry at Bonn, and in the following year he was called to Berlin, where he spent the rest of his life as Professor of Chemistry. He made many contributions to the *Annalen der Chemie*, to the Transactions of the Chemical Society, and to the Philosophical Transactions of the Royal Society, of